

Claims

[c1] 1. An electrostatic actuator, comprising:

- a stationary element;
- an element that is movable with respect to a reference position;
- a position sensor arranged to produce an analog position indication signal that indicates a position of said movable element; and
- a feedback circuit for moving said movable element, said feedback circuit having a signal linearizing circuit to receive said analog position indication signal of said position sensor and a driving circuit to provide a linear position drive signal to said movable element.

[c2] 2. The electrostatic actuator of claim 1, wherein said reference position is a position of said stationary element.

[c3] 3. The electrostatic actuator of claim 1 wherein said linearizing circuit comprises an analog-to-digital converter (ADC) to digitize said position indication signal, and a programmed digital signal processor (DSP) to produce a linear command signal output from said analog position indication signal.

[c4] 4. A circuit to create a drive voltage that is linearly proportional to a position of a movable member of an electrostatic actuator device that is positioned by a voltage applied thereto, comprising:

- a sensor to sense a position of said movable member from a reference position to provide an analog position indicating signal;
- an analog-to-digital converter (ADC) for receiving the analog position indicating signal to convert said analog position indicating signal to a digital position indicating signal;
- a digital signal processor (DSP) for receiving said digital position indicating signal, said DSP being programmed to convert the digital position indicating signal into a digital signal that is linearly proportional to the position of said movable member;
- a digital-to-analog converter (DAC) for receiving said digital signal that is linearly proportional to the position of said movable member for producing a linear analog positioning command; and

a voltage amplifier for receiving said linear analog positioning command to produce a position voltage and for application to said movable member.

[c5] 5. The circuit of claim 4, wherein said reference position is a position referenced to a fixed member of said electrostatic actuator device.

[c6] 6. The circuit of claim 4, wherein said DSP is additionally programmed to scale said digital position indicating signal in the production of said digital signal that is linearly proportional to the position of said movable member.

[c7] 7. A method for operating an electrostatic actuator of the type having a first member that is positionable with respect to a reference position in response to a drive voltage applied therebetween, comprising:
sensing a position of said first element with respect to said reference location;
generating an analog position indicating signal in response to said sensing a position;
linearizing said analog position indicating signal to generate a position drive signal in response thereto;
generating said drive voltage in response to said position drive signal; and
applying said drive voltage to said first member to modify a position of said member.

[c8] 8. The method of claim 7, wherein said reference position is a position of a second member.

[c9] 9. The method of claim 7, wherein said linearizing said analog position comprises scaling said analog position indicating signal.

[c10] 10. The method of claim 7, wherein said linearizing said analog position comprises digitizing said analog position indicating signal and performing said linearizing in a programmed DSP.

[c11] 11. An electrostatic actuator having a first member that is positionable with respect to a reference location in response to a drive voltage applied between said first member and a second member, comprising:
means for sensing a position of said first element with respect to said reference

location;
means for generating an analog position indicating signal in response to an output of said means for sensing a position;
means for linearizing said analog position indicating signal and for generating a position drive signal in response thereto;
means for generating said drive voltage in response to said position drive signal; and
means for applying said drive voltage to said first member to modify a position of said first member.

[c12] 12. The electrostatic actuator of claim 11, wherein said reference location is a location of said second member.

[c13] 13. The method of claim 11, wherein said linearizing said analog position comprises scaling said analog position indicating signal.

[c14] 14. The method of claim 11, wherein said linearizing said analog position comprises digitizing said analog position indicating signal and performing said linearizing in a programmed DSP.